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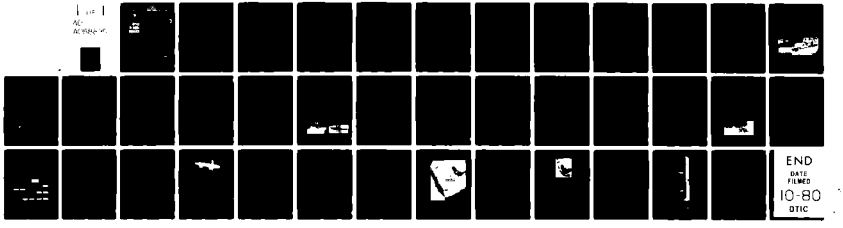

LEVEL II

ONR LONDON CONFERENCE REPORT

C-3-80

OFFICE OF NAVAL RESEARCH

BRANCH OFFICE LONDON ENGLAND

OCEANEXPO '80
BORDEAUX, FRANCE

CLAYTON H. SPIKES, LCDR, USN

31 MARCH 1980

UNITED STATES OF AMERICA

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environment	merchant shipping	piracy	research vessels

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This is a report on the 4th International Exhibition and Symposium on the exploitation of the world's oceans, covering shipbuilding, offshore techniques, harbors, fishing and pollution control, held in Bordeaux, France 4-8 March 1980. The International Sponsoring Committee consisted of the President of the Republic of Senegal and the Chairman of the French National Assembly. Over 84 countries were represented, with emphasis on African, Caribbean and Pacific (A.C.P.) States, the Arab countries, the Southeast Asian countries and Latin America. Primarily [illegible] showcase for the opulent Arabian

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Ro/Ro ships
Satellite Remote Sensing
seafloor mining
shipyards/shipbuilding
USSR Minister of Geology

20. (con't)

countries, conference discussions ranged from seabed mining techniques to high-seas piracy. The well-attended exhibits covered fields as diverse as aquaculture and lightning research, while the Warsaw Pact was represented by both Poland and the USSR.

OCEANEXPO '80--BORDEAUX, FRANCE

It was billed as the largest international meeting on the exploitation of the oceans; covering shipbuilding, offshore techniques, harbor development, the fishing industry and pollution control. Held at the Exposition Park on the man-made lake just outside Bordeaux from 4 to 8 March, 1980, there were both exhibitions and symposia to keep attendees occupied. The scope of this year's event was expanded to cover more maritime areas than the three previous OCEANEXPOs, in hopes of enticing greater international exchange in the science and technology fields. Right from the start the spotlight was on the African and Arabian countries that participated in the programs which outlined their industrial and investment policies, development projects and cooperative agreements on exploitation of their vast marine resources. The President of the Republic of Senegal, H. E. Leopold Sedar Senghor, was Honorary President of the overall affair and numerous high-ranking delegates from over 84 countries attended. This report will highlight both the conference sessions, and the separate exhibitions that would appear to be of interest to the intended readership.

CONFERENCES

1. The African, Caribbean and Pacific (A.C.P.) States Symposium.

Chaired by the Ivory Coast's Naval Minister, H. E. Lamine Fadika, its theme was "the sea for man and mankind in the service of peaceful and harmonious development." Among other eminent members of the United Nations attending, the Director of Shipping for the U.N. Conference on Trade and Development (UNCTAD), Mr. A. Al Jadir, was a speaker. Central to most presentations was the status of industrial and commercial relationships between the Western European maritime nations and the West African countries with respect to exploration and exploitation of offshore energy and biological resources. This communication channel has of late been dubbed "the North-South dialogue," and it was evident that most participants seized upon the opportunity to conduct extensive information exchange--scientists, manufacturers and businessmen alike--with regard to their present oceanic activities and achievements, plus their medium and long-term projects. They were introduced to sub-regional maritime organizations such as the Maritime Conference of West and Central African States, which includes almost all the country's Atlantic states, from Nouadhibou to Luanda (over 5000 km of coastline, not to mention the immense collateral ocean "economic zones"). Speakers expressed the hope that a new International Maritime Order would result from this meeting, one that would be structured so that vertical and horizontal (geographically speaking) cooperation would lend impetus to training and technical exchange programs among the A.C.P. countries. Even landlocked nations got in the act, voicing their dissatisfaction with what they consider are inequities in the disbursement of offshore riches, especially seabed minerals and petroleum products.

Other topics included port infrastructure, merchant fleet development and technology transfer from North to South, in return it seems, for some of those offshore treasures.

2. The Arab Countries, the Sea and the Ocean.

Heading this session was H. E. Dr. Fayez Ibrahim Badr, Chairman of the Saudi Arabian Ports Authority; speakers were from France, UK, Kuwait, Algeria, Tunisia and Egypt, as well as Saudi Arabia.

The first topic was "Development of Arab Maritime Activities and the Scope for Increased Cooperation" and covered such dramatic topics as nuclear weapons, smuggling and high-seas piracy. It was emphasized that the three most sought-after materials that come from the sea (or seabed)--fish, minerals and petroleum--must be approached in an ordered manner as follows: (1) best possible inventories of recoverable assets made by appropriate nations, (2) maintain open communication links between all member countries and (3) ensure maximum research is conducted to afford the most efficient retrieval

methods to all investing nations. All attendees agreed that a goal of the highest priority was to secure and maintain a better dialogue between the nine EEC members and all Mideast states.

It was made known that the Arabs are on the verge of letting funds for research into wave and tidal energy schemes. The topic of satellite remote sensing was also broached, with at least one of the ideas involving utilization of maritime remote sensing techniques to monitor fishing vessels in proclaimed offshore economic zones.

Training of merchant seamen was also covered at length. The Economic Institute for Maritime Transport in Bordeaux presently trains quite a few seamen from Mideast and African nations. To enhance opportunities for the developing countries, some West African states are to build their own training facilities, in hopes of luring some European trainees south. In this manner it is believed there will be created a viable means of technology transfer--in the political as well as economic sense--between northern and southern area industries. Many of the West African delegates believed the main reasoning for such a large number of OCEANEXPO '80 invitations going to their countries was that trade links with France have grown literally by leaps and bounds (e.g., 31% of Bordeaux' external trade in 1978 was with West African nations). On the other side of the coin is the fact that while 8% of the world's ship traffic is controlled by the third world, only 0.02% of that involves African countries. The speaker hammered home his belief that solidarity must first and foremost be established among the poorer countries themselves so that they may act in concert when dealing with their richer neighbors at the northern end of the axis.

On to the subject of gangsterism and piracy; His Excellency spoke on the issues revolving around actions aimed at the Arab nations. He broke the discussion into three themes as such:

a. The simplicity of merely changing vessels' names, repainting them or discharging cargoes at unscheduled ports elicited extensive discussion. The basic problem seems to stem from an outdated 1932 law that permits money to be let from a bank based solely on submission of a bill of lading, which apparently can be easily forged. One frightening example of brigands at work took place last year: timber purchased by a Saudi company was on its way from Southeast Asia when it was mysteriously diverted to another port, the timber sold, the ship sold, repainted, given a new name and official papers--total loss $10 million. Another ship with cargo enroute to Jeddah was diverted to Lebanon with the same ensuing nefarious scenario--total loss $15 million. The recent publicity on the sale of a tanker's oil to an unscrupulous third party, then scuttling the ship for the insurance money brought to light a not uncommon practice in the underworld management of shipping--so say the Saudis. One bright point is that Arab shippers are working closely with the Greek government, in whose country much of

the duplicity has taken place.

b. Arab shippers are unanimous in their feeling that present-day containerization practices make smuggling a prosperous livelihood. With only one, or at most two, doors, the thieves place the contraband at the far end of the box behind tons of other material so that more often than not the harried inspector never gets to it. The "Saudi Box" is due to be introduced full-scale in the near future, much to the chagrin of many shipping magnates. These are multi-door containers that will permit ready access to at least four of the sides. Opposition of course comes from the 10-15% higher initial investments to purchase this design, manufactured--you guessed it--by Saudi firms. However, the Arabs believe this extra monetary outlay will be more than compensated for by four factors: (1) less breakage, (2) decrease in load/unloading time, (3) decrease in number of required customs agents and (4) decrease in money lost to smugglers. The Saudis are so high on their scheme that they plan to exempt those companies that choose to use their design from certain Saudi port duties.

c. Last year Lloyds of London declared the Persian Gulf area a "war zone," based on the unstable situation in Iran and since heightened by the Soviet move into Afghanistan. Arabs were miffed to say the least; this increased the insurance premiums for an average oil tanker by about $40,000. Lloyds was officially queried as to why the volatile South African area had never been similarly declared. At any rate, the Arabs have put the wheels in motion to establish their own insurance corporation but claim that it will take up to five years before it is ready for business.

The next speaker was the Chairman of the Franco-Arab Chamber of Commerce, in Paris, who touted the general revolution in navigational modernization techniques at Arab ports in recent years. He also noted that the tourism industry should be developed to its fullest extent in all Arab nations and, in the same breath, lambasted the EEC for not setting its own house in order with respect to viable fishing rights policies. Increases in Arab oil prices were rationalized (as far as he was concerned anyway); money was needed to conduct technological research into alternate energy schemes and pollution control (especially the Dover Channel, believe it or not). Furthermore, he admitted that his organization was extremely wary of the powder-keg atmosphere in the Mediterranean.

The final presentation of this popular session dealt with "Legal Agreements With the Oil Companies in the Arab World." Terminology played a large part in this talk; e.g., nationalization of oil fields has been legally cited from precedents based on own-countries' "permanent sovereignty over natural resources." On the subject of contracts there exist four types: (1) a concessionary agreement is the oldest form used in the Arab oil business, (2) a production-sharing agreement, (3) a joint-venture agreement (a com-

mercial vice legal term) has proven of late to be the most popular throughout the Mideast; this can be among any number of industrial companies, (4) a technical-assistance agreement which is, in effect, a service contract that binds the company to transfer technical skills to the host country.

3. The Third International Symposium of Dredging Technology.

Organized by the Fluid Engineering Department of the British Hydromechanics Research Association (BHRA) at Cranfield, this 2 1/2-day session provided a varied program of technical presentations and discussions; e.g., waterway development and maintenance problems, spoil disposal methodology and environmental aspects of open-water disposal of dredged materials. The latter has created the requirement for increased utilization of confined disposal areas, of which construction of stable retaining dykes in soft foundation conditions is a major worldwide problem. US technology, especially the use of fabric-based foundation support was covered in depth.

An impressive study was described in a paper by Sir William Halcroy and Partners who are involved in the selection of plant contract arrangements for the construction of a new port in Dubai. The presentation explained how the difficulties of excavating approximately 110 million m^3 of material to provide a 17 km long approach channel were overcome. There were also several papers given by Netherlands representatives, an acknowledged center of dredging expertise. One of the Dutch presenters from their Mineral Technology Institute described a dredging wheel excavator encompassing a revolutionary new shape that resists soil blockage. Another paper from MTI introduced a new method of dredging oil spillages, which in recent years has become a focal point in stemming oceanic pollution. This plan has already proven more successful than chemical control, both in speed and lack of toxicity.

The overall program was subdivided into seven sessions as such: (1) contracts, (2) control/equipment design, (3) pipelines/pumps, (4) actual operations, (5) dredging heads/wear, (6) siltation/sedimentation and (7) environmental effects/spoils dispersal.

4. Marine Pollution Prevention and Control.

Organized by the French Ministry of the Environment, various representatives from that establishment, the French National Test Laboratory, the French National Center for the Exploitation of the Oceans (CNEXO) and the Brittany Oceanological Center spoke on four main themes:

a. Means and techniques for monitoring the marine environment--keeping track of hydrocarbons dumped into the sea by remote sensing (especially satellites) and the National Network for Observation of the Marine Environment were covered.

b. Means and techniques for forecasting the impact of major coastal

development operations on the natural environment--discussions centered around the problems associated with aquafarming, port development and the creation of coastal industrial complexes.

c. Protection of coastal sites--talks were on protection of the natural environment and conservation of coastal and lake-shore areas.

d. Means and techniques for controlling pollution of the marine environment--the two discussion topics were the experience obtained during the two years after the Amoco-Cadiz disaster, and the advantages and disadvantages of simulation tests for development of anti-pollution gear.

5. Latin America, the Sea and the Ocean.

Sponsored by the French-Latin American Chamber of Commerce, speakers were from Paris, Peru, and Guatemala. The economic development possibilities of this region and potential investment programs in fisheries, mineral exploitation and petroleum products were discussed throughout the program.

6. Port Development.

Organized by the French Ministry of Transport (Merchant Navy Department), the following technical themes were covered during this day-long session:

a. Construction and maintenance of ports; from general siting studies to the most recent aspects of construction techniques.

b. Passenger traffic equipment, including all means of locomotion, from hovercraft to seabed crawlers.

c. Equipment for reception, storage and transfer of various categories of merchandise.

d. General land and sea equipments for operation of a port complex, especially coastal navigation aids.

7. The Southeast Asian Countries.

Chaired by the unlikely personage of a zoology instructor from UK's University of Newcastle-Upon-Tyne, Dr. S. Evans, contributing speakers came from all five of the Association of Southeast Asian Nations (ASEAN): Malaysia, Indonesia, The Philippines, Singapore and Thailand. The central theme surrounded the fact that there are billions of dollars of riches as yet untapped in the Southeast Asian Seas; the problem is in procurement in an efficient manner on an equitable scale.

The problems and strategies in the development of fisheries in Indonesia was presented by First Admiral Iman Sardjono of that nation. He covered

all aspects of the industry's present status, future developmental trends and ongoing cooperative efforts among ASEAN member states. Of great interest was the topic of possible capital, technological and expertise inputs that will be required from outside the region in the coming decade. Offshore mineral exploration was a subject that elicited heated debate but, with the bottom line of unavailable prospecting assets, no firm program commitments were forthcoming. England's entries were on coral reef structure and their associated marine communities, and the representative from Jakarta lectured on the development of marine-oriented tourism, specifically with respect to their attraction via recreation centers.

8. Surveillance of the 200-Mile Limit.

This half-day symposium was arranged by the French Society of Armament Materials (SOFMA). That organization's manager, Mr. J. Besancon, covered the equipment available from French manufacturers that can assist attendant countries in their monitoring operations. Utilization of a coast guard patrol vessel was highlighted, and guidelines and recommended operations for other ship-types were included in the spirited discussions. The Chief Engineer for the French Society of Naval Construction, Mr. le Corre, spoke on surveillance efforts in tropical waters and the special equipment that is required. Mr. F. Charollais of France's Interministerial Mission of the Sea gave the concluding speech which boiled down to a wait-and-see attitude relative to the perpetually ongoing Law of the Sea (LOS) proceedings.

9. New Approaches by French Shipbuilding Yards.

Presided over by the Delegate General of the French Shipbuilders' Association, this session covered only four topics, given below:

a. Contributions of a shipyard to associated technological fields.

b. The shipyards' role in fostering maritime cooperation with the fleets of developing countries.

c. The development of a new class of Ro/Ro cargo vessels.

d. Examples of industrial cooperation in shipbuilding between French and Moroccan shipyards.

10. International Maritime Cooperation.

This day-long symposium was organized and sponsored by the Dakar Club with the personal assistance of H. E. Fadika. Representatives from the following principalities gave presentations: Senegal, Singapore, Peru, France, Ghana, Ivory Coast, Guatemala, Morocco, Saudi Arabia, Austria and Spain. The session was broken down into five themes, each listed below:

a. Ports and marine transport: H. E. Fadika chaired this conclave and, as the Spokesman of the "group of 77" for maritime questions, droned on about his ideals surrounding North-South cooperation through reflection, dialogue and synopsis. The only paper given concerned combatting fraudulent maritime practices, which was redundant in many respects to the aforementioned Arab session (see paragraph 2. of this report).

b. Management of fishery resources: Singapore's Ambassador to France, H. E. Mr. D. Marshall, was this section's chairman and the paper presented here delved into the problems surrounding balanced and rational management of fishery resources between countries. This covered quite a few rather uncommon but definitely related subjects, among them fishing law, aquafarming projects and potential fishing agreements between coastal states and their landlocked neighbors.

c. Vocational training and scientific cooperation in the maritime field: This round-table discussion brought to light the seemingly obvious fact that the much-quoted regional maritime cooperation required must be based upon a thorough understanding, between the North and South, of each area's most crucial and sensitive problems--especially those with the prospect for dividing and irremediably opposing such relationships.

d. Ocean bed resources: The Vice-President of the Republic of Guatemala, H. E. Mr. F. Villagan Kramer, chaired this interesting meeting. Most of the representatives appeared to be more than willing to divulge as much unclassified information as they had available with respect to the mining of polymetallic seafloor modules, hoping obviously to glean some worthwhile data in return. All agreed that OPEC is this puerile industry's greatest asset; as their prices continue to spiral upward, seabed mining looks more and more economically lucrative. At the close, agreement was reached on the handling of a shopping list of needed new-technology equipments that will be required by the Southern countries, from the Northern countries.

e. Environment and prospects: H. E. Mr. Abdel-Kader Chanderli, Principal Consultant of the Arab Economic and Social Development Fund, was this group's chairman. The relationship between ocean and climate, albeit a broad topic to broach, engendered healthy discussions and comments from all concerned. Better prognostication techniques, using numerical modeling and satellite remote sensing--a panacea in many attendees' eyes--were bandied about. Also noted was the rapid progress made in weather modification techniques.

The final talk was by a Mr. Jesus Money from the presumptuously named National Institute of Futurology, in Madrid. To further generate supposed worldliness, his presentation was entitled "Maritime Prospects." Both good and bad predictions were highlighted but again most everything was predicated upon the establishment, and maintenance, of excellent rapport between Europe and the Mideast/African nations (i.e., the old "North-South Dialogue"), not only in verbage but also technology and hardware transfer.

EXHIBITIONS

FRANCE

1. Construction & Development Society (S.C.D.).

This firm, based in Paris, displayed their latest hydraulic oil skimmers: *PELICAN*, a manned version, and *GOELAND*, the unmanned model. *PELICAN* can be transported by air, road or sea, with overall dimensions of 10.6 m length, 2.5 m width, 3.5 m height, 0.8 m draft, weighing about 8.5 tons (see Figure 1 below). Its size and shallow draft make it especially capable for work on rivers, canals, harbors and coastal areas. It is steered by a jet deflector operating off twin rudders and can transit at 8 kts; dynamic work can be carried out at speeds from 0.5 kts astern to 3 kts forward in seas up to 2 ft (Beaufort number 3). The laminar flow created by the turbine-propeller through the submersible raft attracts all floating debris, with normal attached collector capacity of 4200 m^3. The oil skimmer itself successively thickens, draws and decants oil, recovering only the polluting agents at input/output rates of 1 m^3 per sec/30 m^3 per hr respectively; internal storage capacity is 500 l.

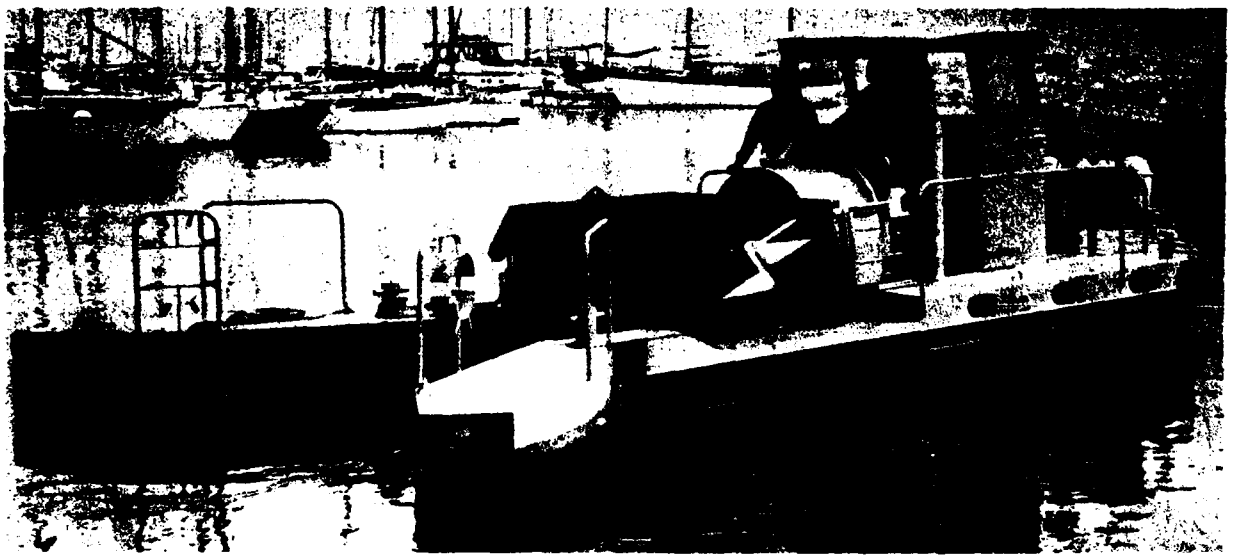


Figure 1

Some other unique applications include utilization as a fire-fighter--with one 70 m swivelling lance-cannon, one 45 mm adjustable jet lance and two 45 mm fire couplings available, the system can pump out water at 75 m^3/hr. It can also carry out sub-aquatic work--oxygenation at 150 m^3/hr, and weeding up to depths of 2 m, which can be carried out simultaneously during normal surface collection operations.

GOELAND was developed by S.C.D. in collaboration with the French Oil Spill Response Authority for use in harbors, rivermouths and calm inland waters. At 1.9 m length, 1 m width, 1.8 m height, 110 kg weight and only a 0.3 m draft, this skimmer can recover spills from thin films to layers several centimeters thick at 20 m^3/hr. Its four main features are: (1) rapid recovery of oil over 95% pure, without induced emulsions, minimizing the necessity for storage and evacuation, (2) simple operational characteristics using only a water pressure line, fed by an emergency fire pump or simple standard fire plug, (3) can be used in a stationary mode, and in an explosive atmosphere, (4) requires minimum maintenance as it contains no moving parts.

2. Caustier France Company.

Based in Perpignan (approximately 400 miles south of Paris), this organization rolled out two models of continuous sifter beach cleaners. Both operate with total hydraulic systems in which all moving parts are covered to protect them from sand and dust. All necessary controls are located in the tractor where the operator manipulates the boring tool to a depth of 18 cm; the collected sand is thrown by a beater into a filter screen conveyor through which only sand will pass. The wastes are collected in a container which can be tipped into a trailer (see Figure 2 below).

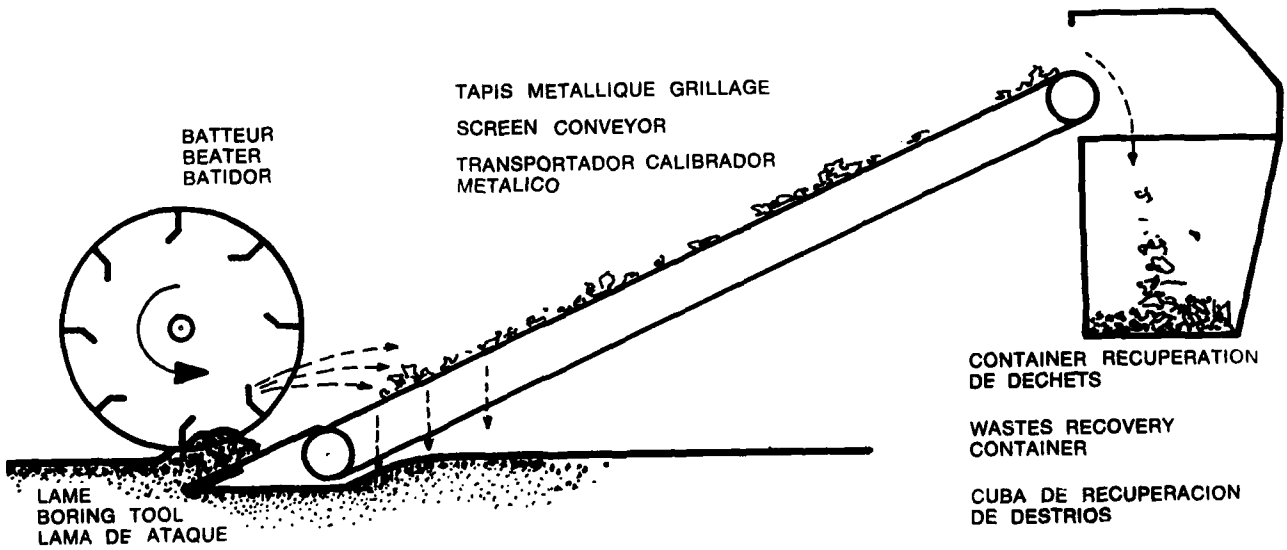


Figure 2

Basic specifications for the firm's two sifter-types are below:

	Type G.C. 001	Type P.G. 111
weight	3.5 tons	2.2 tons
surface area treated	2.5 acres/hr	1.5 acres/hr
tractor power required	85 hp	50 hp
treated sand output	27.5 tons/hr	16.5 tons/hr

3. Numelec-Sein.

Located in St. Denis, just to the north of Paris, this company was touting their Image Digital Processing System line called PERICOLOR. The display shown gave clear crisp pictures that were being picked up from an operational satellite in real-time. As far as normal usage, images may come to the system from an external computer's mass memory via a high-speed bidirectional link or directly processed by PERICOLOR by means of its built-in encoder which converts retrieved signals delivered by a transducer (TV camera, photon camera, gamma camera, IR scanner, etc.). Some potential applications would be:

a. Teledetection

(1) Oceanographic/meteorological satellite remote sensing
(2) Oceanic pollution monitoring

b. R&D

(1) IR imagery
(2) thermography
(3) biparametric spectrometry
(4) seismography
(5) microdensitometer imaging
(6) laser imagery
(7) microscopy
(8) IR cartography

c. Astronomy

(1) IR planet analysis
(2) single-photon acquisition
(3) radio-astronomy imagery
(4) x-ray/gamma-ray astronomy

d. Medicine

(1) isotope scanner and gamma camera
(2) x-ray scanner
(3) ultrasound echography

e. Graphics

(1) textile design
(2) graphic art

Basically a fancy color TV that can be hooked up to a variety of optical software and hardware, up to six IBM 3740 floppy disk units can be connected.

Each picture element is stored in a modular expandable random access memory of up to 256 x 256 addressable pixels (64 kwords). The content of each color address is defined by 8-16 bits, with one additional marker bit for super-imposing outlines, graphs, squarings, etc. Video timing is at the rate of an ordinary TV color monitor: the image pattern has 312 lines, 256 of which are effective and is refreshed 50 times/sec. Up to 4096 color combinations are available. Power requirement is 220 V/50 Hz, consumption 500 VA and the main chassis weighs but 35 kg, with dimensions of 360 x 440 x 600 mm. The keyboard unit weighs 5 kg, measuring 115 x 550 x 280 mm and the TV monitor (with 51 cm diagonal screen) measures 440 x 450 x 590 mm, at 40 kg.

4. National Center for the Exploitation of the Oceans (CNEXO).

Set up by law in 1967, the purpose of this body is to ensure that the French Government appropriately supports the scientific and technical efforts necessary to maximize the potential of their available natural ocean resources. It comes under the authority of the Minister of Industry who exercises control through the Delegation for Innovation and Technology. The Interministerial Mission for the Sea (formed in 1978), under authority of the Prime Minister, prepares topics to come up before the Interministerial Committee for the Sea and controls implementation of decisions taken. Applied R&D programs are the responsibility of the following officials:

a. Minister of Industry: energy and mineral resources.
b. Minister of Transport: sea fishing, aquaculture, raising of marine mammals.
c. Minister of Environment & Quality of Life: protection of marine environment.

An overall basic and exploratory research program comes under the Minister of Universities. President of the Interministerial Mission for the Sea presides over the Oceanology Steering Committee which evaluates and coordinates the programs under responsibility of the various ministers. CNEXO offers its technical assistance, which entails orienting and centralizing all pertinent information relative to ministerial actions.

To preclude research teams and equipment being scattered throughout the country, CNEXO has promoted geographical concentration of oceanographic

academic activities at the Universities of Brest, Bordeaux, Marseilles and Paris. It has also set up R&D centers at:

a. Britanny Oceanological Center (COB), Brest.
b. Mediterranean Oceanological Base (BOM), Toulon.
c. Pacific Oceanological Center, (COP), Tahiti.

Compiled and collected information from all French oceanographic bodies are centrally stored at the National Bureau for Oceanic Data (BNDO) at COB.

Projects run by CNEXO are divided into five categories, which cover contacts with commercial, academic, and governmental bodies, as well as their own activities:

a. Exploitation of living organisms (i.e., fishing, aquaculture, breeding).
b. Knowledge and exploration of minerals and fossils (i.e., marine granulates, polymetallic nodules, continental shelf resources, underwater vulcanology).
c. Undersea operations (i.e., environmental impact of coastal activities, man in the sea).
d. Pollution prediction and coastal zone management (i.e., monitoring, pollution mechanisms/consequences, littoral zone resource utilization).
e. Air-ocean interactions (i.e., micro/macro-scale studies, synoptic oceanography, wave and swell studies, ocean energy).

In 1974 CNEXO set up Aquaculture Demonstration, Experimentation and Development (DEVA) Pilot Plants in the English Channel, on the Atlantic and Mediterranean shores and in French tropical territories. 1974 also saw the formation by CNEXO of a company for the Development of Aquaculture in Britanny (SODAB), which carries out intensive salmon breeding/farming in cages in tidal ponds. Starting last year, three other species have been exploited: sole, sea-perch and tropical fresh-water shrimp.

The inventory of mineral resources in the French continental shelf has been carried out by CNEXO in collaboration with the Geological and Mining Research Bureau (BRGM). Unfortunately, it appears that there is little more than sand and gravel making up France's offshore shelf. However, an inventory of other assets (phosphates, ilmenite, etc.) is to be expanded in coming years to third world continental shelf areas which are better supplied, geologically speaking. As for deep ocean polymetallic nodule deposits, CNEXO has been involved in this project for the past ten years. The French Association for the Study and Research of Nodules (AFERNOD) is preparing to mine for these manganese, nickel, copper and cobalt content lumps. CNEXO work has enabled the following actions to take place:

a. Localization: for exploration of a North Pacific zone where maximum nickel, copper and cobalt concentrations can be economically retrieved. Technology developed is based on the concept of remote-controlled double units (sampler and camera) for confirmation of valuable deposits to depths of 6,000 m.

b. Collection Methods: various systems have been studied--mechanical bucket-dredge, hydraulics, and autonomous shuttles based at an underwater work site.

c. Treatment Process: to extract the elements into a usable form.

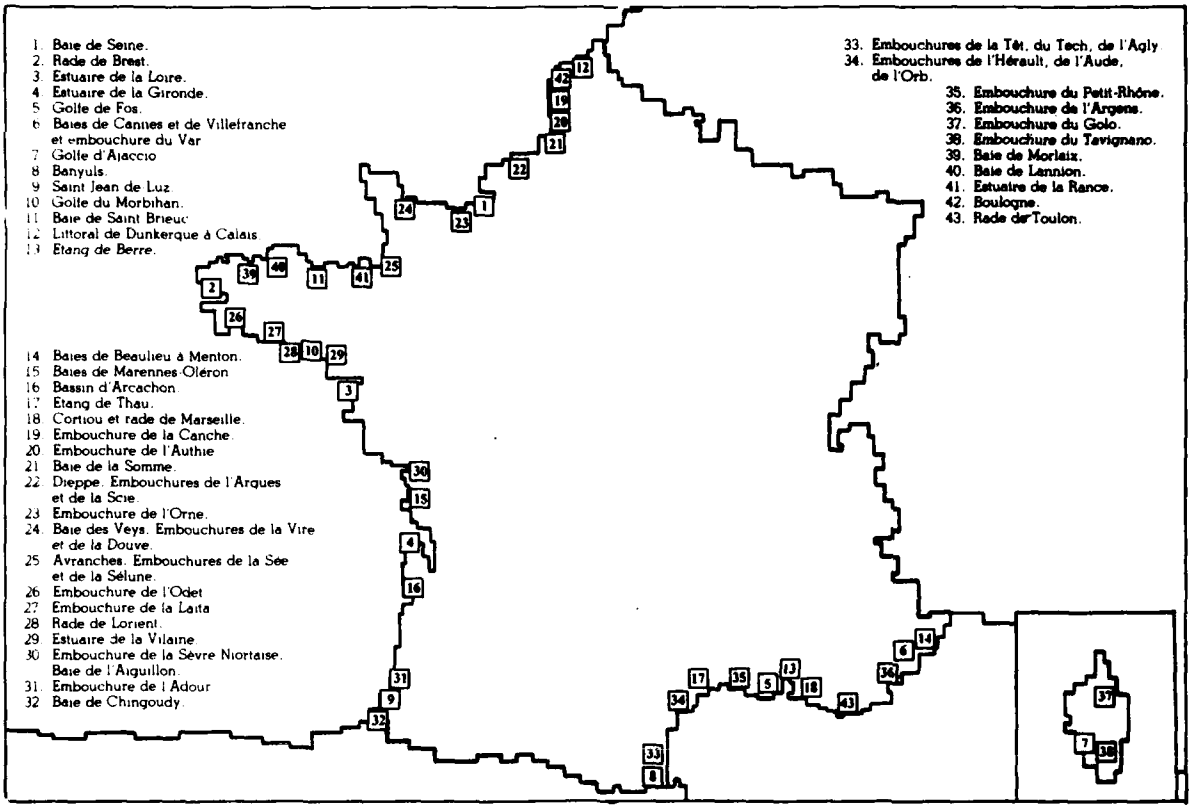
d. Economic Evaluation: studies have made possible an initial estimation of the investment required for constructing a production unit capable of treating 3M tons dry weight per annum.

CNEXO is involved in the search for deep sea oil where a scientific, pre-industrial research evaluation is requested by the Marine Petroleum Study Committee (CEPM). As for alternative energy schemes, CNEXO is responsible for designing a low-power pilot plant Ocean Thermal Energy Conversion (OTEC) station of 1-10 MW, with an eye towards construction of a single demonstration unit for a tropical island location, where they generally have to import their fuel and water.

Since 1970, CNEXO has been operating unmanned towed vehicles to meet the needs of their deep sea geological and biological communities. RAIE (skate-fish) 2 was developed in 1978 and is used for reconnaissance of nodule deposits. Last year EPAULARD (grampus), an autonomous submersible robot that can operate to 6,000 m, proved to be a valuable tool in oil and mining exploratory efforts. Future generation models are already in development; ORQUE (orc) will meet ongoing requirements of the oil and underwater science companies; it will be able to carry out depth measurement projects and inspection tasks with real-time data transmission.

CNEXO manages the National Observation Network for the Quality of the Marine Environment (RNO), which has been progressively set up along French coastal sites since 1974 (see Figure 3). Their goal is two-fold: (1) observe quality of coastal waters continuously, rendering an instantaneous pollution warning system, (2) set up a long-term warning system, enabling evaluation of overall quality of coastal areas for future generations. CNEXO also prepares preliminary research files for prospective coastal nuclear power stations.

Satellite remote sensing data analysis is carried out by CNEXO scientists with a goal toward optimizing detection methodology in the field of fishing, pollution monitoring and navigation.



Since taking charge of her first multi-purpose oceanographic research ship in 1968 (the 2,200 ton *R/V JEAN CHARCOT*; see Figure 4), CNEXO now manages a fleet of nine vessels, the latest of which was launched just two years ago (the 225 ton coastal research vessel *R/V THALIA*; see Figure 5).

Figure 4 « JEAN CHARCOT »

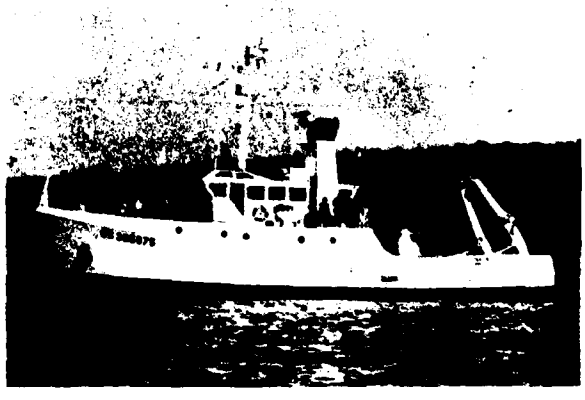


Figure 5 « THALIA »

The manned submersibles *CYANA* and *ARCHIMEDES* are under CNEXO's control. The former craft, with 3,000 m depth capability has been in operation since 1975, while the latter, capable of exploring the deepest ocean trenches down to 11,000 m, has been put into "operational reserve" because of its age (almost 20 years) and high operating costs.

Lastly, CNEXO manages numerous data and personnel exchange programs with such oceanic heavyweights as US, USSR, UK, Canada, Japan, Korea and Spain.

5. French Electricity Company.

Based in Paris, this obviously large conglomerate of companies had an eye-catching display on solar energy in their country. In January, France receives between 0.5 and 3.0 kWh of solar energy per m^2; in July those figures jump to 4.0 and 7.0. Numerous capture plans for residential structures have been devised and tested, using either air or water as the medium. In a graphic example, a 12-house test was conducted over a year that resulted in 45% of available incident solar energy being captured by the installations and an average of 18% actually utilized in some manner. This worked out to a savings of about 33% in electricity costs for these homes during that period--definitely not to be scoffed at.

Since 1976, quite a few heliostats have been built. One of the first, with a rather crude parabolic mirror arrangement, generated 80 kW by heating the fluid medium to 300°C. As progress was made, efficiency rose: 200-300 kW at only 200-250°C. Plans are now on the drawing board for an 800 kW system but the most ambitious project is called THÉMIS, utilizing 350 heliostats covering 50 m^2 capturing reflected solar energy from a mirrored area of 1.75 hectares (4.3 acres). This should heat the water in the closed circuit system to 450°C and hopefully generate upwards of 2 MW of power. To give an idea of just how great a role solar energy will most likely play in France in the future, computer calculations have predicted the mean savings that should be realized at certain locations for today's average homeowner with a modern system employing a 4 m^2 capture surface on his rooftop (see Figure 6).

6. French Atomic Energy Commission (C.E.A.).

An all-encompassing organization, some of the more pertinent aspects of its current work are highlighted below:

a. Desalination: The electrodialysis systems created by C.E.A. for the desalting of brackish water are finding increased acceptance, most recently in Egypt and Saudi Arabia. A plant run by solar power

is now in operation at the Cadarache nuclear research establishment and an experimental seawater desalinator powered by an aerogenerator has been mounted on an offshore platform near Marseille.

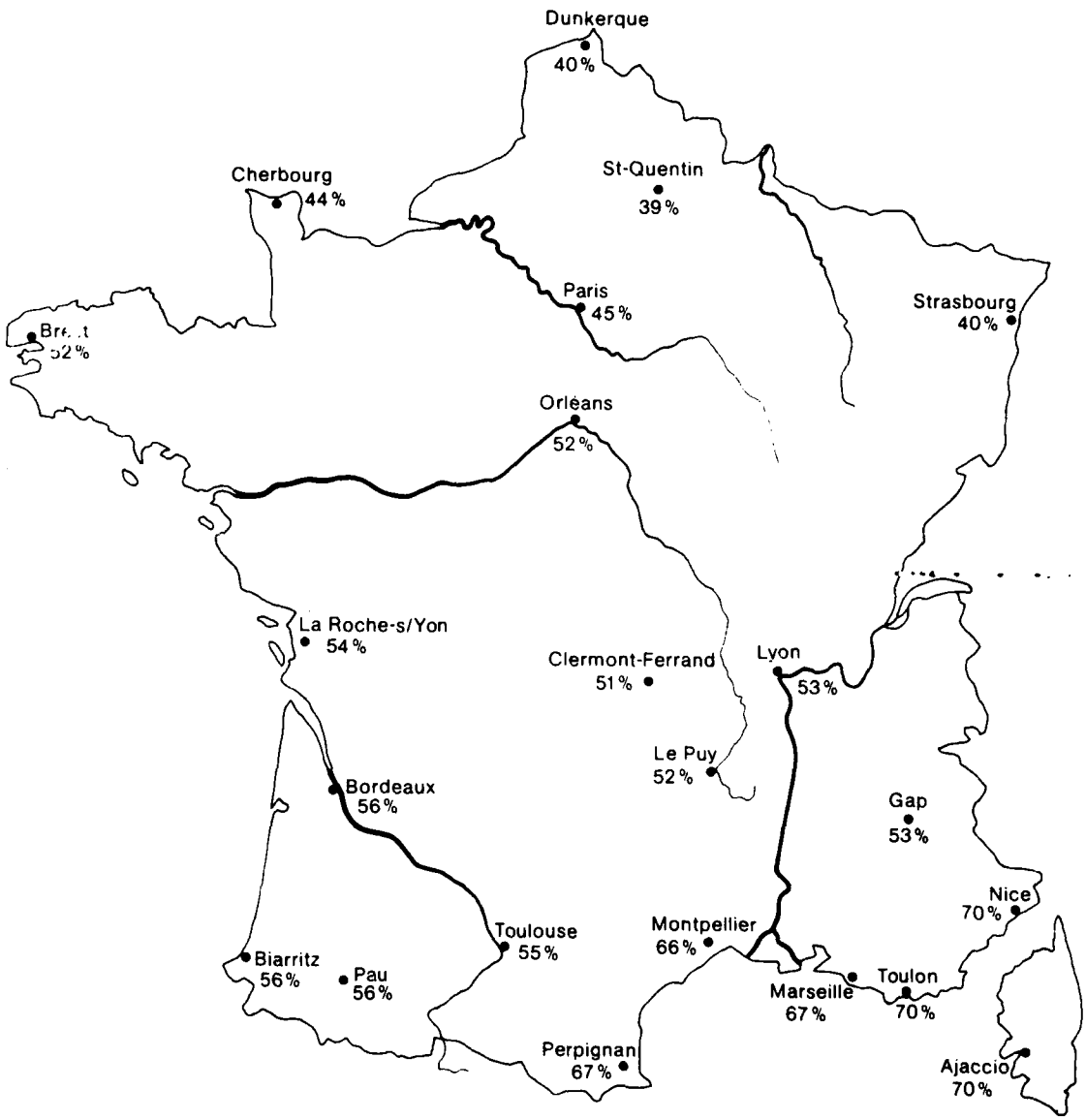


Figure 6

b. Aeolian Energy: The Paris-based Aerowatt Company, a member of C.E.A. since 1978, has built over a thousand machines for various countries throughout the world, delivering outputs between 24 and 100 kW, with rotors ranging in diameter from 1.2 to 9.2 m. Efficiency and reliability of these generators has steadily improved as a result of metallurgical studies, mechanical tests and stress calculations; so much so that each new system is now guaranteed for 5 years. Only 3 m/sec of wind speed is required to make these windmills economically viable in remote areas.

c. Energy Storage: Heat storage by molten salts is the principle applied in a diver's heater that has an output of 30 kWh and heats the diver's suit through flexible tubing. A 10 kWh high-temperature module (450°C) based on the same principle, using liquid sodium, has also been produced. Specific energy of 100 Wh/kg has been obtained in a high-temperature accumulator (550°C), using a nickel fluoride and FliNak electrolyte with a lithium electrode; eventually 300 Wh/kg should be reached. The seasonal storage of heat in confined aquifers, up to 10 trillion BTU's worth, is being investigated as a possibility, with particular reference to temperatures, depths and capacities. Carbon and glass fibre compounds show promise as material for high-speed fly wheels, of which the high rate of energy accumulation and release increases the number of operating cycles possible per unit of time. Best performance obtained so far is that of a carbon fibre disk which reached a rotational speed of 641 m/sec for an energy storage of 27 Wh/kg.

d. Vulcanology: C.E.A. is engaged in research on Etna and in Indonesia, especially as regards testing of a magnetometric system that was used to give warning of impending eruption during the 1978 Guadelupe volcano activity. Its success has bred more systems, specifically on the Merapi volcano in Java.

e. Lightning research: Work by C.E.A. involves not only the mechanisms of the phenomenon, which are investigated by optical, acoustic and electromagnetic recording, but includes direct measurement of discharge currents, effects on distant telecommunications, protection schemes, the behavior of high towers, grounding systems, etc. Essentially, work is carried out by inducing discharge through a rocket, fired during an electrical storm, trailing a wire. During recent tests, 13 strokes were obtained in 14 attempts with a maximum current of 50 kA. Furthermore, C.E.A. has granted a license for the sale of an electrical storm warning system.

7. SOTRAPLEX, Le Havre.

Claiming to have a corner on the underwater technology market in France, this organization has four main departments as follows:

a. Submarine Engineering
   (1) Structural design
   (2) Plant/equipment design

b. Submarine Civil Engineering
   (1) Building/maintenance of man-made structures
   (2) Laying pipes, siphons and cables
   (3) Platform erection
   (4) Slinging/raising wreckage

c. Offshore Works
   (1) Maintenance of submerged metal and concrete platforms and tanks.
   (2) Buoy anchoring, mooring and maintenance
   (3) Harbor dredging/construction surveys

d. Quick-Service, Anti-Pollution, Ship's Assistance
   (1) Emergency action
   (2) Ship hull inspections
   (3) Refloating operations

Ultra-sonic inspection techniques have been perfected by this firm, to where a team of one data interpreter and two divers can inspect up to 100 sections per day on materials up to several inches thick with an accuracy of ±0.2 mm. Another unique offering is a 24 hr worldwide emergency service. When a French Naval tanker lost a blade from one of its screws in the Canary Islands not long ago, an engineer, four divers and two tons of equipment were flown out within hours to effect the necessary repairs.

This company also predicts that in the very near future they will be able to carry out a complete careening of ships as large as megaton tankers while still afloat. They claim the highest quality work, effected as rapidly as if the vessel were drydocked. Other unique applications they are involved with include insubmersible North Sea buoys made of glass fiber reinforced resin that have lasted up to 15 years, channel beacons utilizing solar power and oceanic wind generators.

8. European Society of Environmental Studies and Tests (SEEEE).

This conglomerate has two main divisions as such:

a. Division 1
   (1) Measurement techniques

(2) Trials
(3) Experimentation
(4) Data compilation & synthesis
(5) Engineering guidance

b. Division 2
(1) Industrial plant engineering
(2) Turnkey project work
(3) Maintenance & technical assistance

Areas of activity revolve around the three fields of environment, oceanography and safety. Carrying out work ranging from development planning and implementation of wharves on the Ogoorie River, Gabon to the designing of a hyperbaric operating room at Nancy, France, one of the most interesting current projects was SEEEE's design and construction of the first prototype installation for large-quantity crude oil storage in sealed, covered pits. In one of the most hostile environments imaginable--the Sahara Desert in Algeria--they built the system in three parts:

a. A pit in the shape of a truncated pyramid, with a 40,000 m^3 volume, hermetically sealed by a PVC Nitrile plastic film, in which the oil is stored.

b. An insulating floating membrane which prevents oxidization, at the same time supporting an automatic fire extinguishing network.

c. An inflatable roof, 10,000 m^2, 15 m high, consisting of a cable network, covered with a neoprene-hypalon polyester fabric which ensures airtightness. Pressure of 340 Pa is required to hold up the roof, which is also carbon-charged to facilitate the discharge of static electricity.

INDONESIA

1. Marine Fisheries.

As the fifth most populous country in the world, it has been estimated that the potential of Indonesian marine fisheries is about five million metric tons per year as standing stock, while the maximum sustainable yield is almost half of that (only 1.2 million tons was taken in 1978). Some 250,000 vessels ply their waters in search of skipjack, tuna, mackerel, sardines, anchovies and shrimp. Japan maintains the greatest outside presence, with at least seven capital ventures located in the area and a total annual investment of about $35 million.

The government has persuaded the UN to fund a $2.5 million project covering 1979-1983 that is supposed to provide assistance for the self-employed fisherman. This should, in some part, also decrease the current

problems related to over-exploitation of at least one species, shrimps, that have recently been declared "endangered." Indonesia shrimping has hence been closed to any further investment start-ups, whether domestic or foreign.

Probably the strongest plea heard at this exhibition was that the EEC, if appropriately approached by the ASEAN countries, may design a survey project to accurately assess resource management requirements so that fishing could be carried out with maximum efficiency and productivity. They do, however, realize that this will never transpire until European private and public interests are more prevalent in Indonesia's fishing grounds; right now the only enterprise is a Norwegian shrimping venture.

IVORY COAST

1. Ministry of Maritime Affairs (Maritime Training Dept.).

Maritime Training, on an official scale, was first started in this country in 1957 under the aegis of the Lagoon & Fisheries Service. Since 1974, the Regional Center for the Maritime and Apprenticeship (CREAM) has been jointly run with the Republic of Togo, but located in Abidjan, the capital of the Ivory Coast. In 1975, CREAM was given an old trawler, *ADILAFA*, to assist in realistic shipboard training courses. Quite a few other countries take advantage of these facilities, among others Gabon, Mali, Central African Republic, and Cameroon.

In 1974, the government created specific training courses for deep sea ship officers and high-level engineering officers (ship master, engineering officer, harbor officer). Furthermore, considering the country's rapid economic progress in the past few years, the government feels that the current training structure is inadequate--hence the creation of the Academy of Sea Sciences & Techniques which will provide for appropriate training of both sea and shore-based personnel at all levels. Also, the new Regional Maritime Training Center will be open for business in late 1981.

2. Ivory Coast Maritime Transport Company (SITRAM).

November 1977 saw the launching of this country's first container ship; today there are eight of these 132,000 DWT vessels, with twelve more on the way by next year. SITRAM, created in 1967, handles about 20% of the country's foreign trade today and will increase this figure to at least 30% by 1990. Since 1976 it has been completely owned by the state, and from recent calculations, appears to be headed in the right direction, carrying nearly 1 million tons of cargo last year. SITRAM has a network of over 60 agents in over 20 foreign countries from the US to Switzerland. The company is made up of three specialized branches: (1) SITRAM International

Shipping Agencies (SISA), (2) SITRAM Ivory Coast Society of Maritime Operations (SIVOM), (3) SITRAM Ivory Coast Engineering Society for Maritime Transport and International Logistics (SIETRANS).

Being a sailor for SITRAM is pretty inviting too. All certified seamen are confirmed of their appointment after two years of satisfactory service. Then they are eligible to recieve a shore wage equal to 50% of their seagoing salary if they have been working for the company for less than five years; after five years they get 100%! Add this to no-cost rations while at sea (and an equal monetary subsidy onshore), free medical treatment at sea and 48 days of paid leave for every 120 days at sea, and you will probably have a happy crew.

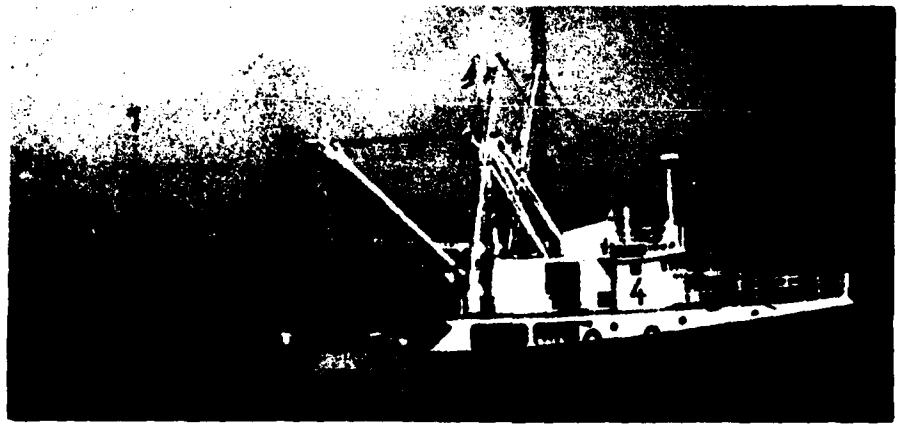
KUWAIT

1. Kuwait Institute for Scientific Research (Mariculture & Fisheries Dept).

This Institute was established back in 1967, with the Marine Biology and Fisheries Division being one of three branches within the organization. Recently changed to its present title of Mariculture & Fisheries Department, it now employs some 85 staff working on seven different research projects as follows:

a. Shrimp culture
b. Fish culture
c. Micro-organism culture
d. Fish health management
e. Nutrition
f. Shrimp stock evaluation & management
g. Fisheries management

The Department has four well-equipped laboratory facilities and a 151-ton research vessel, *RV ASMAK 4* (see Figure 7 below).



RV Asmak 4

Figure 7

2 Kuwait Oil Company.

They use seismic surveys extensively to create up-to-date geological maps of all possible field production areas. As of now, there are ten apportioned fields with over 800 wells drilled throughout. Oil, gas and L.P.G. products (propane, butane, K.N.G., naphtha and bitumen) are the main exports of this burgeoning company. Modernization of port facilities continues: new single point moorings, dredging, navigation aids, etc. Their first state-owned L.P.G. tanker, MC AL-K[illegible] went into operation early last year.

The company numbers approximately 5,000 persons, with just about half being Kuwaitis. Their computer facilities are vast, relative to the physical size of the complexes monitored (but, nevertheless, compatible with the country's newfound wealth, as exemplified by its rise in GNP). Three fully compatible processors with shareable peripherals are available. A front-end communications processor has been added to increase the efficiency of message handling. Both the On-line Accounting and Stores Information System (OASIS) and the Product Information Control System (PICS) have increased the number of remote locations using terminals linked to the central main-frame computer.

MONACO

1. European Oceanic Association (EUROCEAN).

This conglomerate was created in 1970 by industrialists and scientists with the aim of maximizing oceanic resource utilization while minimizing detrimental effects on its environment. They use the latest science and technology developments to help guide their governments in planning for future endeavors in the oceanographic field. Projects undertaken are usually large and complex, based on proven research techniques involving applied development and engineering, including component testing and pilot plants, prior to commercial application. The time horizon is between 5-10 years, although more short-term programs are often considered. National and international governmental cooperation, coupled with practical assistance through funding in intergovernmental programs, makes for high technology growth in this sector of industry, which for a large part, is export-oriented. An example of the international flavor of this organization can be gleaned from the nations represented on the Executive Board: Italy, France, Belgium, Switzerland, Norway, UK, Netherlands and Sweden; even Jacques Cousteau is a permanent member!

Claiming that there is no ocean-related industrial activity in which at least one of EUROCEAN's 25 member companies do not possess first-rate knowledge and experience, their major groups of activities are broken down thusly:

a. Marine and Coastal Engineering Design
b. Heavy Industry (including shipbuilding)
c. Equipment and Instrument Manufacture
d. Civil Engineering
e. Mining
f. Metallurgy
g. Chemical Processing
h. Oil and Gas Exploration/Production
i. Marine Transportation
j. Food Processing
k. International Banking

More closely related to the topic at hand are the following four programs within the company's R&D framework:

a. Energy--Ocean Thermal Energy Conversion (OTEC), first conceptualized by the Frenchman d'Arsonval in 1881, has come a long way and since 1976 EUROCEAN has had its hand in. They are lobbying for the integration of a variety of industrial activities that would combine with basic OTEC operations (see Figure 8 below).

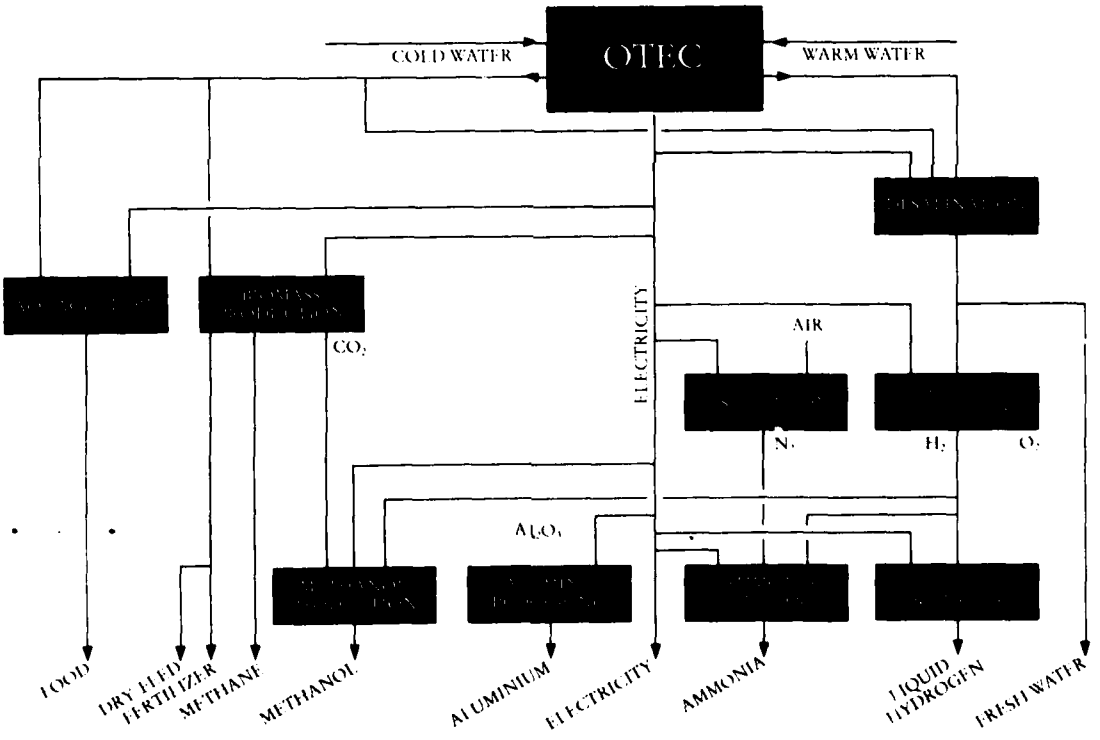
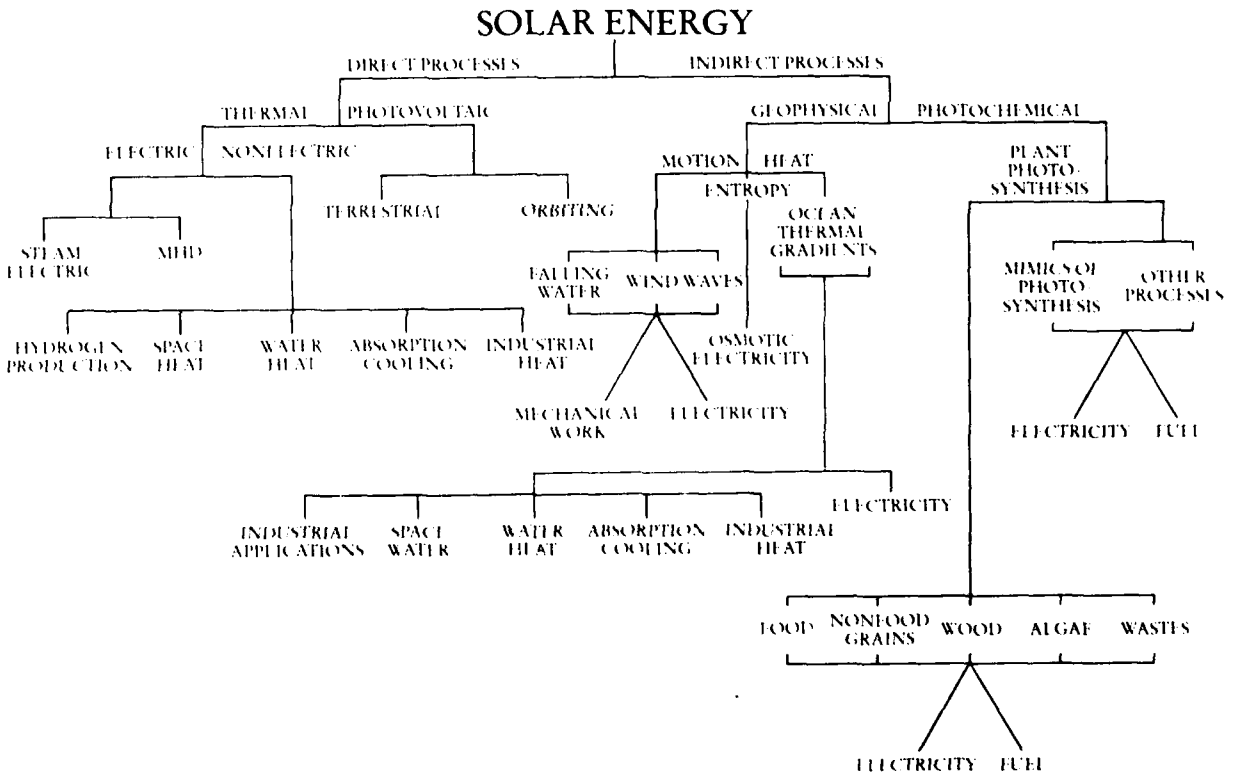


Figure 8

For anybody with an eye to environmental goings-on, the fact that aero-generators (i.e., windmills) are making a revolutionary comeback comes as no surprise. EUROCEAN, in its exalted position of decision-maker, has decided to fully back advanced studies into offshore and coastal wind energy systems. Recent evaluation programs include an assessment of siting problems, a comparison of horizontal and vertical axis types, energy storage schemes, world-wide development status, as well as economic and environmental aspects. They are pushing for development of large wind turbine units (over 1 MW each) to be integrated into an offshore network in the Canary Islands, which will include an aquaculture project utilizing spin-off artificial upwelling.

In addition, a third subdivision of this Energy Group is furthering its general study into utilization of various marine sources, especially waves, salinity gradients, biomass and solar ponds. Most members agree that additional R&D is required to enable a realistic industrial evaluation of their potential to be made. On the overall subject of Solar Energy, see Figure 9 below.



Options for harnessing solar energy

Figure 9

b. Aquaculture--With a view towards tropical island applications, most likely coupled with OTEC operations, EUROCEAN has funded field tests in mariculture since 1972 at St. Croix in the Virgin Islands. Data from this project has been incorporated into a larger combined energy/aquaculture/ desalination plant that is presently on the drawing boards. Utilizing nature's blend of plentiful sunlight and cold nutrient-rich deep water, plans call for establishment of large basins onshore or in lagoons where the continuous insolation can generate photosynthesis. In this way phytoplankton production is increased, thus forming the vital first link in the food chain for culturing shellfish or other seafood.

c. Oil Pollution--EUROCEAN has formed a high-level study group to investigate the industrial possibilities of the conception and development of an operational intervention system against marine oil pollution, so that the relevant authorities will have available a viable proposal for a practical and effective system when a breakthrough in the legal and political arenas is hopefully achieved. Furthermore, in order to promote understanding and cooperation between oil companies, peripheral industries and governmental/ intergovernmental organizations in this field, EUROCEAN organized, in Monaco last month, an international conference on "Petroleum and the Marine Environment." With an eye to the inevitable, EUROCEAN has also launched a Consultative Advisory Committee for the Polar Marine Environment directly aimed at the protection of living resources when petroleum exploitation in these areas gets into full swing.

d. Related Projects--A group has completed an exhaustive assessment of polymetallic mining opportunities on Western Europe's continental shelves. Areas in the Pacific have also been studied and it appears that the Gulf of Bothnia, between Sweden and Finland, will be used as a testing ground for future worldwide harvesting systems.

As a result of the ongoing conflicts between the industrial and recreational utilization of heavily populated areas (e.g., Western Europe, California), as well as the environmental considerations, the extension of a number of normally land-based activities to offshore zones is becoming increasingly attractive. In this context, various commercial alternatives of floating and artificial islands have been thoroughly investigated by EUROCEAN.

One of EUROCEAN's members has developed a 1250-ton submarine intended for repair and maintenance of offshore oil and gas installations, which will provide long-term, year-round, diver-supported underwater operations independent of both weather and mother ships (see Figure 10).

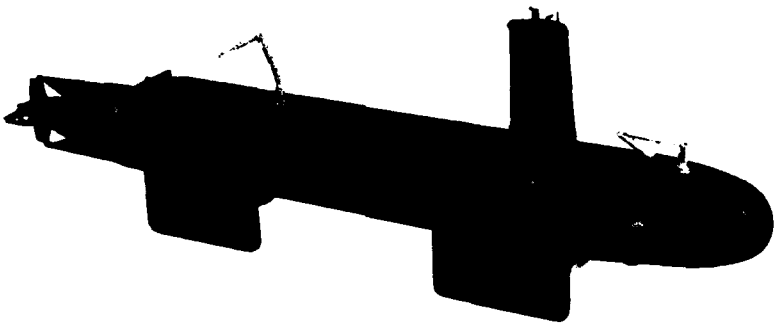


Figure 10

Satellite and aircraft maritime remote sensing techniques in the field of exploiting marine resources, monitoring oceanic industry, and maximizing fishery yields are continuously being studied. To this end, EUROCEAN works closely with US organizations.

NETHERLANDS

1. Hydrodynamic (Port and Waterway Engineers).

Founded in 1968, this respected firm deals in six basic nautical areas:

a. Ports (harbor entrances, drydocks, shipyards, etc.)

b. Waterways (approach channels, canals, etc.)

c. Offshore and coastal engineering (man-made islands, breakwaters, mining, etc.)

d. Land development (recreational facilities, drainage/irrigation projects, etc.)

e. Water management (reservoirs, flood protection, etc.)

f. Economic development (R&D feasibility studies, field investigations, etc.)

Among other projects, they have designed a French port that can accommodate 500,000 DWT tankers and outer harbor channels for such ports as Buenos Aires, Le Havre, Lisbon and Montevideo. They have developed many man-made islands--in the North Sea off the coasts of Holland and Belgium, and their most dramatic achievement to date, an artificial archipelago for gas and oil exploration in the Beaufort Sea.

2. Royal Bos Kalis Westminster Group.

Founded in 1910, this company boasts the largest, most versatile dredging fleet in the world. They also specialize in civil and marine engineering, land/submarine pipeline construction and laying, and oil terminal development and construction. Their catamaran survey vessel, *DUPLUS*, is about half the size of NRL's *USNS HAYES*. The construction of the moles in Rotterdam's harbor mouth was undertaken by this company, as well as dredging 10M m^3 of spoil from the channel at Teeside, Northern England for eventual usage by 150,000 DWT tankers. The dredged material was pumped ashore to reclaim some 500 acres of new land, on which refinery facilities have since been constructed. Recently, their organization completed construction of oil storage tanks to be located on the seafloor in deep water off Rotterdam's harbor entrance; capacity is 1 1/2M barrels. This consortium also manages the operations of the 34,000 ton *ORCA*, used for unconventional seafloor tasks, pipelaying and offshore hoist work using its 800 ton revolving crane. All in all, this is a truly diversified group, which if called upon to carry out any oceanic related contract, appears to possess the technical background required to achieve the sought-after results in a rapid and efficient manner.

POLAND

1. General.

With over 50,000 Polish engineers working outside their country, the largest contracts are with the following nations: East and West Germany, Czechoslovakia, USSR, Hungary, Libya, Iraq, Algeria, Nigeria and Turkey. Overall, more than 600 individual industrial plants put up by, or with the aid of, Polish labor are operating in over 60 countries worldwide. The bulk of business is undertaken by five foreign trade enterprises: Polimex-Cekop, Elektrim, Centrozap, Kopex and Metalexport. At this exhibition, the area of floor space taken up exemplified the emphasis Poland puts on creating a good front--only the Saudi Arabian exhibit was larger.

2. Polish Academy of Sciences.

The PAS runs 98 different scientific communities which affiliate some 5,000 of the most prominent scientists and technologists in the country; a few of the most interesting committees are listed below:

a. Committee for Space Research--space meteorology, teledetection and satellite communications.

b. Committee for Sea Studies--computer management of oceanographic data and the application of spectroscopic methodology in detecting traces of metals in the ocean.

c. Man and the Environment Committee--participates in international research within the framework of the United Nations Educational, Scientific and Cultural Organization (UNESCO), particularly their subsidiary establishment, the International Oceanographic Commission (IOC).

d. Committee for Polar Research--organizing scientific expeditions into the Arctic and Antarctic areas.

e. Committee of Geological Sciences--prospecting for lignite, a valuable raw material for the power industry, has been the highest priority of this branch. With new extraction techniques, it is predicted that lignite output will have increased from 40M tons per year today to 85M tons by 1985, and 200M tons in 2000.

3. Polish Shipyards.

Last year almost 100 new ships were launched from Poland's shipyard facilities, from tuna seiners to ferries. They handed over to outside countries 87 ships totalling about 800,000 DWT, an 8% increase from 1978's figures (while the shipyard work force decreased by 1.5% it should be added). Hardest pressed of the yards was that at Gdynia (on the Gulf of Danzig, about 200 miles northwest of Warsaw), which, although constructing only 12 ships, the net tonnage exceeded 50% of the total Polish production output. Furthermore, 5 of the vessels (against a total of 10 in the whole industry) were prototypes.

4. Polish Merchant Fleet.

Handling 37M tons of cargo last year, these vessels serve the regular lines of almost 500 ports in 95 countries, which certainly maintains their established position in international shipping. 1979 saw the 50th anniversary of formal service between Gdynia and London. On the subject of fishing, despite economic zone curtailments, the Polish seaborne fishing industry established three new joint ventures--one with Morocco and two with Peru--which expect catches upwards of a quarter of a million tons annually. Access was gained to new fishing grounds on the basis of agreements drawn up with Canada and the US, and fishery surveys are underway off the coasts of New Zealand and Australia. 1979's total yield was about 20% greater than the previous year, much of which can be attributed to automation born of recent R&D.

Poland maintains trade contracts with almost all of the so-called "developing countries". The main role is played by the Southeast Asian nations, especially India and Pakistan. The North African countries come in second place, primarily Egypt and to a lesser extent Algeria, Morocco, Sudan and Tunisia. Then, the briskest business is done with the South American states, mostly Brazil, Argentina, Columbia and Peru. Approximately half of her exports to these countries consist of electrical

engineering industrial products, of which ships and ship fittings top the list.

SAUDIA ARABIA

This was by far the most impressive (and luxurious) exhibit--touting the explosion of building activities in and around their ports, there were beautiful mock-ups, color movies, souvenirs, and various mechanical displays to whet the observer's nautical appetite. The Saudi Ports Authority (SPA) was originated in September of 1976, when its one task was to end the congestion that had built up at the country's seaports. They accomplished this feat in five short months. The queues of ships--300 in all, representing 2M tons of cargo--disappeared and there have been no such delays since. Exemplifying the effect of various technical improvements is the astonishing increase in revenue by SPA of 350% over just one year: 1977-1978. For safety's sake, they have also poured more than $100M into modern firefighting systems. The five major Saudian ports are highlighted below:

1. Jeddah:

The largest Red Sea port, it recorded a 20% annual increase in DWT discharged and ships alongside in 1978; 10M tons and 3,900 ships respectively. Jeddah handled 50% of all the Kingdom's seaborne imports in 1978, 85% of all food imports and 75% of ship personnel traffic. By next year it will have a total of 45 berths It is the largest port in the world for livestock imports; 98,000 freight tons passed through in 1978.

2. Dammam.

The largest of the Kingdom's Persian Gulf ports, its growth can be viewed through its 191% increase in tonnage handled in three years: 4.6M in 1975 to 13.4M in 1978. Ships handled rose with even more flourish: 710 ships in 1975 to 2,300 in 1978 (a whopping 244%). Efficiency in cargo handling is nevertheless the earmark of success in SPA's overall improvement program, and Dammam has increased its unloading capability from 400 tons/ ship/day in 1975 to more than 1200 tons today (200%). 1978 saw the completion of the port's dredging project--56M m^3 gives Damman a deep water approach channel that can accomodate even the largest dry-cargo vessels.

3. Jubail.

Once a tiny fishing village, known to the outside world only as a source of pearls, this newly designed port complex now can handle 7M tons of cargo per year. In 1974 only 3,500 people lived here--in

Ports administered by the Ports Authority

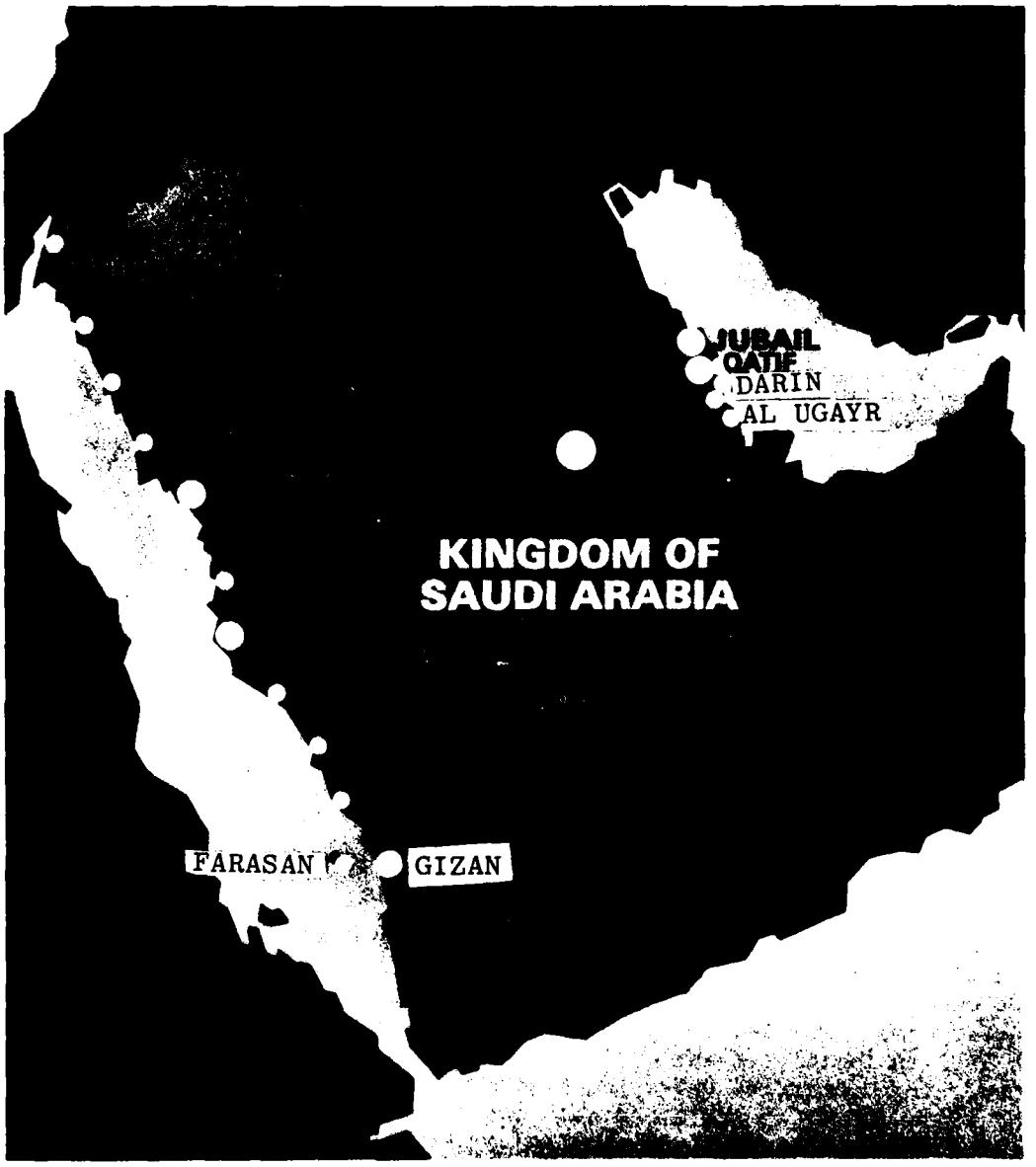


Figure 11

1984 it will be at least 170,000.

4. Gizan.

Three years ago, this place had two small berths that could only accomodate vessels drawing less than 5 m. Now there are 3 km of new breakwaters, 340 m of quay walls, three refurbished berths and a 20 m Ro/Ro ramp. The harbor outer basin and approach channel have all been dredged to 10 m.

5. Yanbu.

From a two-berth port in 1978, this facility now can handle 14 ships at once, with 2 km of new berthing spaces. Dredging has made it possible for vessels with drafts up to 12 m to now call here and its annual handling capacity will be 3M tons by 1983, 4 1/2M by 1985.

There are a total of nine other ports under SPA's jurisdiction (see Figure 11).

SUDAN

1. Red Sea Commission.

In the central rift zone between Saudi Arabia and Sudan scientific evidence has shown that upwards of $5B worth of metal constituents exist in the metalliferous muds. Named the "Atlantis II" deep (See Figure 12) the main elements to be extracted are zinc, copper, silver, cadmium, manganese, and iron.

In 1974, an agreement calling for joint utilization of all potentially profitable bottom muds was concluded between Saudia Arabia and Sudan, essentially dividing the area in question into three zones. Each country has exclusive sovereign rights over the zone between its coast line and the central common zone, while both nations have equal rights in the latter area. The Red Sea Commission, based in Jeddah, was established in 1975 to facilitate and supervise developmental activities in the common zone. The Commission chose the French Bureau of Geological Research and Mines (BRGM) as its technical consulting firm. Preussag, a large mining and metallurgical processing company from West Germany, with good experience in the Atlantis II area, is entrusted with the feasibility study of extracting the minerals. Saudi Arabia funds Commission work, intending to recover the expense from eventual production revenues. The ambitious technical and economic feasibility studies, altogether necessary prior to actual recovery operations beginning, are expected to cost about $150M.

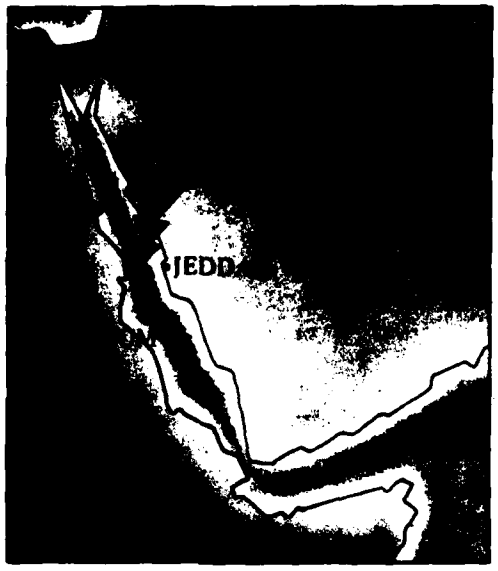


Figure 12

USSR

1. Ministry for Geology (MINGEO).

Yes, even the Soviets decided to show up at this exhibition and their real-time navigation and geophysical computing system, MARS, was their prize display. The Moscow-based MINGEO utilizes MARS on their oceanographic vessels conducting offshore geological and geophysical research work. The three main system components are: (1) integrated satellite navigation element, (2) seismic digital recording element and (3) onboard geophysical computing center. The SatNav digital receiver can handle inputs from not only satellites, but also Decca, Loran-C, and Omega. Incoming radio geodetic data is processed through their own Poisk receiver. The Russian-made GNGKA-2 gravity meter has an accuracy of ± 1 miligal (± 1 cm/sec^2) during a 3-5 day voyage (which compares well with our similar equipment). This part of the MARS complex is made up of a twin set of crystal gravimeters, stabilized through a liquid-filling system on a high-precision gyro platform.

For collection of magnetic data, they again turned to Russian gear--a quantum marine magnetometer/gradiometer, the KMMG-2, backed up by a marine proton magnetometer, the MMP-2. Magnetic field measurements conducted with this equipment reach accuracies of ± 0.02 gamma, horizontal gradients up to 0.0001 gamma/m depending on the baseline distances between navigation sensors. Real-time processing of data generally takes 15-20 sec on the ES 1010 computer.

WEST GERMANY

1. Rhein, Maas & See (RMS).

With their main offices in the city boasting the largest inland harbor in the world, Duisburg (50 miles up the Rhine from Cologne), this well-established company offers specially built vessels that are equally at home on inland waterways and the open sea. Their bridge structures can be moved vertically by hydraulics and they all have an extremely shallow draft. Thus, sailings can be made from most major European waterways (the Rhine, Mosel, Maas, Seine, Rhone) and most canals to all European and North African seaports and inland harbors. Other areas of RMS operations include the Mediterranean, the Black Sea, and the Persian and Arabian Gulfs.

One of the company's most recent innovations, the BArge COntainer (BACO) carrier came into service June of last year. The ship itself is 21,000 DWT, while almost 10,000 tons of cargo can be loaded through its bow on 12 separate floating barges. Overall length of the ship is 205 m, with a 29 m beam, 6.7 m draft and can attain 15 kts. Each barge is capable of carrying 43,000 ft^3, at which their draft is a little over 4 m.

Another new concept is the development, in cooperation with a large West German shipyard, of a 3,000 DWT Ro/Ro container ship. (See Figure 13 below). They claim that this vessel overcomes all the limitations of a normal freighter and is just at home in the deep sea as it is in riverine estuaries. At 93 m length, 18 m beam and a fully-laden draft of only 3.7 m, she can reach 12.5 kts. Maximum carrying space is about 200,000 ft^3.

SUMMARY

Clearly this gathering of high-level dignitaries from all over the globe was another marvelous opportunity for the affluent Arabs to flaunt their nautical wares. Aside from their ostentatiousness, it provided an outstanding opportunity for the North-South dialogue to proliferate along cultural, as well as economic lines. As a taxpayer from one of the so called superpower countries, viewing the third world delegates hovering around their more opulent colleagues from Saudia Arabia, Kuwait, France, West Germany, et al, reminded one of just how powerful the weapons of oil and technology have become; at least these kinds of weapons don't kill, directly--yet.

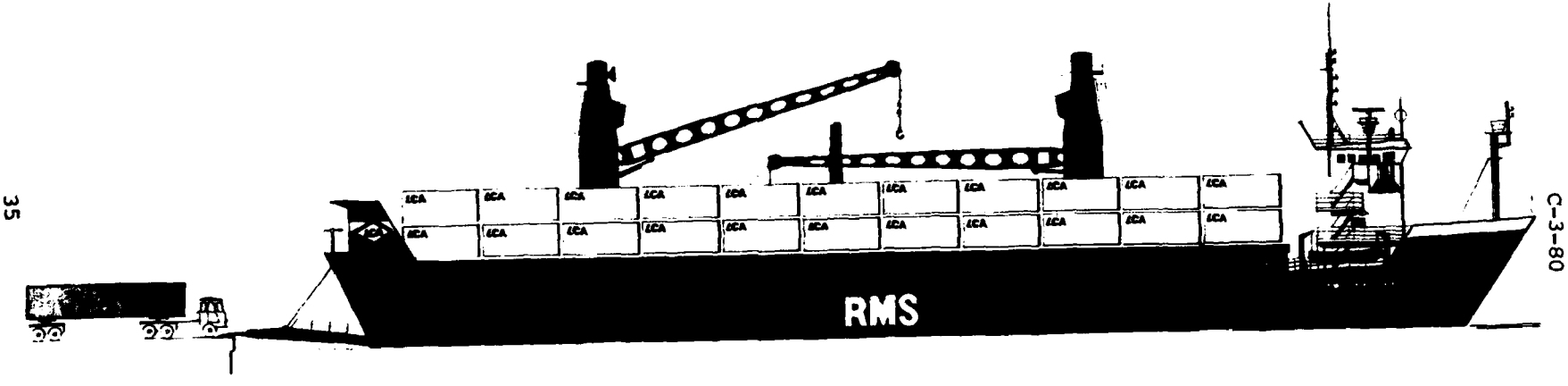


Figure 13

CONCLUSION

Based on the voluminous information presented at the conferences and the wide range of national exhibits offered at OCEANEXPO '80, one can glean much in the way of progress with respect to ocean technology, at least in the Arab, African and European countries represented. For all their wealth, the Arabs are moving ahead in the fields of harbor development and merchant shipping even more rapidly than previously anticipated in most European maritime circles. They seem to have set lower priorities on immediate expansion in the more sophisticated scientific areas of oceanic alternative energy, maritime remote sensing, oceanbed mining, etc.; not to say they are not funding such endeavors, just that they are funded to a much lesser degree, say, than legal attempts to combat what they term widespread piracy. As would be expected, the represented third world countries are likewise expending oceanic technological efforts in the same directions but in a modified relative priority. Improving fishing yields is their number one concern at the moment; spreading their influence in the international shipping trade would appear to be their next highest goal. However, the impression comes through loud and clear that the coastal nations never lose sight of the potential monetary windfalls that should be coming their way in the next two decades when oceanfloor mining gets underway on a large scale. African nations are urging their European counterparts to step up the North-South technology transfer in this area. The continental participants, especially France, continue to develop their oceanographic potential to the fullest, perhaps not as rapidly as was forecasted 20 years ago, but nevertheless, in an ordered and efficient manner. Technology advances in the commercial field of merchant shipping are yielding more revolutionary developments sooner because the cash return is more immediate than such long term projects as tidal energy and seafloor mining, but these issues will come around and much sooner in the wake of expositions of this nature. The biggest question mark at this time is what the Law of the Sea will usher into the maritime world.


FILMED
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